

WHAT IS CLAIMED IS:

1. An electrochemical corrosion sensor that provides multiple channels of output voltage signals, comprising:

5 an array of substantially similar metallic electrodes arranged such that each electrode has a surface area operable to be exposed to an electrolyte at the site of the corrosion and such that each electrode is electrically insulated from other electrodes, wherein a
10 plurality of the electrodes are operable as anodes and a plurality of the electrodes are operable as cathodes; and
 a common electrical lead connecting each electrode through a resistor to a common node, such that a voltage output signal from each electrode may be measured across
15 a resistor associated with the electrode.

2. The sensor of Claim 1, wherein the electrodes are each made from the same material.

20 3. The sensor of Claim 1, wherein each resistor has substantially the same resistance value.

4. The sensor of Claim 1, further comprising a base that supports the electrodes such that an exposed surface
25 of each electrode is exposed at a surface of the base.

5. The sensor of Claim 4, wherein the base and electrodes are fabricated as an integrated circuit:

30 6. The sensor of Claim 4, wherein the electrodes are lengths of metal extending vertically through the base.

7. The sensor of Claim 4, wherein the electrodes
35 extend from one surface of the base and have a thickened cross sectional area above the top surface of the base.

8. The sensor of Claim 4, wherein the base is made from an electrically non conductive material.

5 9. The sensor of Claim 4, wherein the base is made from a conductive material and each electrode has an outer coating that electrically insulates the electrode from the base.

10 10. The sensor of Claim 1, further comprising a second array of electrodes interleaved within the electrodes.

15 11. The sensor of Claim 10, wherein the second array of electrodes is made from a material different from the material from which the electrodes are made.

 12. The sensor of Claim 10, wherein the electrodes of the second array are made from noble metals.

20 13. The sensor of Claim 10, wherein the electrodes of the second array are made from a pH responding material.

25 14. The sensor of Claim 10, further comprising at least a third array of electrodes.